APPLICATIONS OF ACCELERATORS IN EUROPE

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Radiation therapy

1. State of the art IMRT conventional treatment is doing an excellent job but one cannot change physics, so what next?
2. High energy electrons…Immunotherapy……..
3. Protons are here and from the physics they are better so which are the problems and challenges before they can become widely adopted and accepted
4. Is there room for other ions such as helium and carbons which are more conformal and have higher radiobiological effects
5. What is the future for alpha emitters in treatment
6. Can advances in nanoparticle delivery offer future scope for improved brachytherapy
7. Stereotactic radiotherapy/theragnostics …….?

Isotopes – 1

1. Nuclear medicine is today dominated by imaging applications.
2. SPECT procedures (mainly 99mTc) outnumber PET (mainly 18F).
3. In principle replacements exist for most 99mTc applications. Cyclotron production of 99mTc in Europe
4. Neutron-rich isotopes are produced by research reactors and neutron-deficient ones by accelerators (mainly cyclotrons). Some isotopes can be produced by either facility.
5. Research reactors will not die out!

Isotopes – 2

6. Great future for generator isotopes: 68Ge/68Ga, 82Sr/82Rb, etc. Direct production of 68Ga – an alternative to 68Ge/68Ga generators
7. Targeted radionuclide therapies are on the rise: 177Lu and 90Y are the gold standards for β- therapy.
8. Alpha emitters provide more targeted irradiation but are still in short supply: 149Tb (GeV p beams), 211At (29 MeV α beams),…
9. Cyclotron production of alpha emitters or their parent nuclides
10. New non-conventional positron emitters for PET

Accelerators

1. Proton therapy –how do alternative technologies compete with established cyclotron technology - FFAGs, laser acceleration, linacs etc.
2. What are the next steps in carbon therapy?
3. Other ions?

Next steps – Strategy

- Need a list of topics and the people to be involved for each topic
- Put forward ideas and get a community response
- Separate the document into near-term and mid-term needs
- Get contributions from experts in the field in Europe and beyond
- Currently – Manjit, Hywel and Ondrej but looking for help
- To be discussed: need broad endorsement from institutes - how

THANK YOU

Purpose of the document

- Why is it being written?
- How will it help?
  - Funding?
  - Awareness?
- Impact
  - How will we measure it?
  - Need to start today